Research Article

Complementary alternative medicine practices and beliefs in spinal cord injury and non-spinal cord injured individuals

Renuka T. Rudra[1], Gary J. Farkas [2], Shahd Haidar[2], Kristin E. Slavoski[2], Nancy E. Lokey[2], Timothy R. Hudson[3]

[1]Penn State College of Medicine, Hershey, Pennsylvania, USA, [2]Department of Physical Medicine and Rehabilitation, Penn State Milton S. Hershey Medical Center and Penn State College of Medicine, Hershey, Pennsylvania, USA, [3]Department of Physical Medicine and Rehabilitation, McGuire Veterans Medical Center, Richmond, Virginia, USA

Context/Objective: To compare the beliefs and practices of individuals with spinal cord injury (SCI), their friends and family members (F&F SCI), and healthcare professionals (HCP) regarding complementary alternative medicine (CAM).

Design: A questionnaire regarding CAM practices and beliefs was administered to participants on paper or online.

Setting: An academic rehabilitation hospital.

Participants: Ninety-six individuals voluntarily participated in the study. Participants included 28 patients with SCI, 36 F&F SCI, and 32 HCP.

Interventions: Not applicable

Outcome Measures: The questionnaire assessed participants' prior or current use of 14 CAM modalities, their willingness to use CAM in the future or recommend its use, and their beliefs and opinions of CAM.

Results: Participants with SCI and their family and friends, were more likely than HCP to have used CAM ($P \leq 0.01$ and $P \leq 0.03$, respectively) and recommend its use ($P \leq 0.04$ and $P \leq 0.03$, respectively). All three groups showed statistical significance in their willingness to ever use certain CAM modalities ($P \leq 0.03$ for SCI, $P \leq 0.04$ for F&F SCI, and $P \leq 0.02$ for HCP). SCI, F&F SCI, and HCP groups had similar beliefs and opinions regarding CAM.

Conclusion: Patients with SCI as well as their friends and family, have significantly more experience with CAM and are more likely to recommend its use than HCP, suggesting that they are interested and find benefit in alternative healthcare. This warrants further investigation of the integration of CAM into general health practices for those with SCI.

Keywords: Complementary alternative medicine, Spinal cord injury, Healthcare, Medicine

Introduction

Spinal cord injury (SCI) is a medical condition where loss of somatic and autonomic control leads to psychological, socioeconomic, and functional implications. There are an estimated number of 12,000 new SCI cases occurring each year with approximately 243,000 to 347,000 persons living with SCI in the United States. Following the injury, numerous secondary medical complications accompany the injury and are estimated to cost between half a million and two millions dollars.[1] Secondary complications of SCI include obligatory sarcopenia, reduced bone mineral density, dermatologic pressure injuries, cardiopulmonary dysfunction, autonomic dysreflexia, deep vein thrombosis/pulmonary embolism, neurogenic bowel, neurogenic bladder, flaccid or spastic paralysis, chronic neuropathic and/or nociceptive pain, and sexual dysfunction.[2] While there is currently no cure for SCI, secondary complications need to be addressed

Correspondence to: Gary J. Farkas, Department of Physical Medicine and Rehabilitation, Penn State Milton S. Hershey Medical Center, Penn State College of Medicine, 500 University Drive, P.O. Box 850, Mail Code R120, Hershey, Pennsylvania 17033-0850, USA; Ph: 717-531-0003, x284930, 717-531-0354. Email: gfarkas@pennstatehealth.psu.edu

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to ensure a better overall quality of life and reduce mortality rates.

Interest in alternative medicine and utilization of complementary alternative medicine (CAM) has become increasingly popular in the United States and worldwide to supplement the standard of care.[3–5] Along with the standard treatments prescribed by medical practitioners, CAM, defined as a group of diverse medical and healthcare systems, practices, and products that are not generally considered part of conventional medicine, is also used by a subset of patients with SCI in managing secondary complications that result from the injury.[6] The application of CAM to a variety of chronic illnesses has been explored,[4,7–14] but the investigation of its use in the SCI population has been limited and these studies typically focus on the use of a single CAM modality.[15–19]

Previous investigation has led to the conclusion that current or prior use or exposure to CAM, leads to more favorable opinions towards it.[20] In this study, we hypothesize that healthcare providers have less experience with using CAM when compared to participants with SCI and to the friends and family of patients with SCI, and are therefore less likely to recommend its use. To our knowledge, there is no study that illustrates this dichotomy that may exist between patients with SCI and their friends and family as well as healthcare professionals with regards to CAM. Keeping in mind the aim of providing patient centered care, it is crucial to investigate this potential divide so that it can be addressed and improved upon in the clinical setting.

Methods

Participants and setting

A questionnaire integrating the CAM Health Belief Questionnaire (CHBQ) and Integrative Medicine Attitude Questionnaire (IMAQ) was administered from June 2015 to July 2015 at a rural academic rehabilitation center in United States. The CHBQ and IMAQ have both been previously validated and are considered reliable assessment tools.[21,22] The integrated questionnaire was administered to patients with SCI and to their friends and family members in two settings: outpatient SCI clinic and a SCI support group. The survey was also administered to hospital faculty and staff, which included, physicians, nurses, nurse practitioners, physician assistants, neuropsychologists, medical assistants, pharmacists, case managers, social workers, rehabilitation aids, and physical, occupational, speech, and recreational therapists. Participants who identified as having a SCI were grouped as "SCI", those who identified as friends and family of patients with SCI were grouped as "friends and family of SCI" (F&F SCI), and hospital faculty and staff participants were grouped as "healthcare professionals" (HCP). All participation was voluntarily. Both paper and an online version of the questionnaire, via Survey Monkey (Palo Alto, CA, USA), were utilized to collect the data.

The questionnaire

The questionnaire consisted of three components. The first component assessed the participants' prior or current use of 14 CAM modalities, and whether or not they would ever use or recommend use of the modalities. The modalities included biofeedback, hypnotherapy, meditation/yoga/relaxation/imagery, t'ai chi/qi gong, traditional oriental medicine (including acupuncture/acupressure), ayurveda, curanderismo, chiropractic, massage, osteopathy, therapeutic touch/reiki, spirituality/prayer, herbal/botanical/supplements, and homeopathy. These specific modalities were included as they were the same modalities in the validated and reliable CHBQ questionnaire.[21] The definitions of four modalities on the survey were provided to the participants by the senior author, a licensed physician acupuncturist and physiatrist (Table 2). These particular definitions were derived from reputable associations, national institutes, and/or scholarly literature and provided under the assumption that these modalities would be the least familiar to the participants.[23–26] The second part of the questionnaire, composed of twenty-two questions, assessed the participants' beliefs and opinions regarding CAM, utilizing a seven-point Likert scale.[21] The final component consisted of questions to assess the demographic information of the participants. These questions included: (1) presence or absence of a SCI, (2) description of profession, (3) gender, (4) ethnicity, (5) age, (6) last routine medical checkup, (7) if cholesterol has been checked in the last five years, (8) whether or not blood pressure is checked periodically, (9) whether or not the participant exercises for thirty-minutes three times or more per week, and (10) whether the participant is a current cigarette smoker.

Statistical analysis

All analyses were performed using Statistical Analysis systems (SAS) software (Version 9.3, SAS Institute, Cary, NC, USA). Comparisons for this study were made between the responses of individuals with SCI, healthcare professionals, and laypersons. Descriptive analysis was performed using proportions for categorical variables and mean and standard deviation for continuously distributed variables. Comparisons between groups were analyzed using fisher's exact test or chi-

Table 1 Participant demographic information.

Group		Spinal Cord Injury (n = 28)	Friends & Family of Spinal Cord Injury (n = 36)	Healthcare Professionals (n = 32)
Gender (n)	Female	9	19	24
	Male	18	8	8
	Unknown/Not Reported	1	9	0
Age (n)	15–19 years	1	0	0
	20–29 years	3	9	12
	30–39 years	5	4	6
	40–49 years	7	4	6
	50–59 years	7	7	6
	> 60 years	5	2	2
	Unknown	0	10	0
Race (n)	Caucasian	25	24	30
	African American	0	1	0
	Chinese	0	0	1
	Vietnamese	1	0	1
	Filipino	0	1	0
	Puerto Rican	0	1	0
	Other	1	0	0
	Unknown	1	9	0

Table 2 Complementary alternative medicine (CAM) modalities and their definitions provided to participants.[23–26]

CAM Modality	Definition
T'ai chi/qi gong	Chinese medicine that integrates physical postures, breathing techniques and focused intention for healing.
Ayurveda	One of the world's oldest holistic (whole body) healing systems. Based on the belief that health and wellness depends on a delicate balance between mind, body and spirit. Primary focus is to promote good health, rather than fight disease.
Curanderismo	A form of folk healing that includes prayer, herbal medicine, healing rituals, spiritualism, massage, and psychic healing.
Therapeutic touch/ reiki	Administered by "laying on of hands" and is based on the idea that an unseen "life force energy" flows through us and is what causes us to be alive. When "life force energy" is low you are open to sickness.

Table 3 Have ever used complementary alternative medicine (CAM).

CAM Modality	SCI (n = 28)	F&F SCI (n = 36)	HCP (n = 32)	P – value
Biofeedback	25 (89.29%)	31 (86.11%)	23 (71.88%)	NS
Hypnosis	26 (92.86%)	33 (91.67%)	29 (90.63%)	NS
Meditation/Yoga/Relaxation/ Imagery	23 (82.14%)	24 (66.67%)	14 (34.75%)	0.008#
T'ai Chi/Qi Gong	27 (96.43%)	35 (97.22%)	26 (81.25%)	0.033#
Traditional Oriental Medicine	25 (89.29%)	34 (94.44%)	28 (87.50%)	NS
Ayurveda	27 (96.43)	36 (100%)	32 (100%)	NS
Curanderismo	28 (100%)	36 (100%)	32 (100%)	NS
Chiropractic	20 (71.43%)	26 (72.22%)	17 (53.13%)	NS
Massage	18 (64.29%)	20 (55.56%)	9 (28.13%)	0.012#
Osteopathy	28 (100%)	34 (94.44%)	25 (78.13%)	0.009#
Therapeutic Touch/Reiki	26 (92.86%)	35 (97.22%)	26 (81.25%)	0.009*
Spirituality/Prayer	19 (67.86%)	27 (75.00%)	17 (53.13%)	NS
Herbal/Botanical/Supplements	25 (89.29%)	27 (75.00%)	21 (65.63%)	NS
Homeopathy	27 (96.43%)	33 (91.67%)	27 (84.38%)	NS

#Chi-square.
*Fisher's Exact Test.
NS, not significant ($P > 0.05$).

square for the discrete responses of the first component of the questionnaire, while the Wilcoxon rank-sum test was used to compare responses for the Likert type questions of the second component of the questionnaire. The significance level was set at $\alpha < 0.05$.

Results

Demographic characteristics

Demographic information is presented in Table 1. Ninety-six participants filled out the questionnaire, including 28 patients with SCI, 36 F&F SCI, and 32

Table 4 Would recommend complementary alternative medicine (CAM).

CAM Modality	SCI (n=28)	F&F SCI (n=36)	HCP (n=32)	P – value
Biofeedback	24 (85.17%)	29 (80.56%)	19 (59.38)	0.039#
Hypnosis	26 (92.86%)	31 (86.11%)	28 (87.50%)	NS
Meditation/Yoga/Relaxation/ Imagery	24 (85.71%)	24 (66.67%)	11 (34.38%)	0.0002#
T'ai Chi/Qi Gong	26 (92.86%)	35 (97.22%)	24 (75.00%)	0.011#
Traditional Oriental Medicine	25 (89.29%)	32 (88.89%)	25 (78.13%)	NS
Ayurveda	27 (96.43%)	36 (100%)	29 (90.63%)	NS
Curanderismo	27 (96.43%)	36 (100%)	31 (96.88%)	NS
Chiropractic	22 (78.57%)	25 (69.44%)	20 (62.50%)	NS
Massage	20 (71.43)	21 (58.33%)	11 (34.38%)	0.013#
Osteopathy	28 (100%)	32 (88.89%)	23 (71.88%)	0.006#
Therapeutic Touch/Reiki	27 (96.43%)	35 (97.22%)	26 (81.25%)	0.033#
Spirituality/Prayer	24 (85.71%)	29 (80.56%)	15 (46.88%)	0.001#
Herbal/Botanical/Supplements	26 (92.86%)	30 (83.33%)	23 (71.88%)	NS
Homeopathy	27 (96.43%)	33 (91.67%)	26 (81.25%)	0.016*

#Chi-square.
*Fisher's Exact Test.
NS, not significant (P > 0.05).

Table 5 Would ever use complementary alternative medicine (CAM).

CAM Modality	SCI (n=28)	F&F SCI (n=36)	HCP (n=32)	P – value
Biofeedback	17 (60.71%)	17 (47.22%)	18 (56.25%)	NS
Hypnosis	16 (57.14%)	28 (77.78%)	21 (65.63%)	0.008*
Meditation/Yoga/Relaxation/ Imagery	14 (50.00%)	20 (55.56%)	14 (43.75%)	NS
T'ai Chi/Qi Gong	18 (64.29%)	22 (61.11%)	19 (59.38%)	0.033*
Traditional Oriental Medicine	15 (53.57%)	22 (61.11%)	18 (56.25%)	0.029*
Ayurveda	20 (71.43%)	27 (75.00%)	23 (71.88%)	0.040*
Curanderismo	20 (71.43%)	32 (88.89%)	31 (96.88%)	0.014#
Chiropractic	17 (60.71%)	19 (52.78%)	22 (68.75%)	0.015*
Massage	14 (50.00%)	18 (50.00%)	13 (40.63%)	NS
Osteopathy	21 (75.00%)	23 (68.75%)	22 (68.75%)	0.026*
Therapeutic Touch/Reiki	19 (67.86%)	27 (75.00%)	26 (81.25%)	0.023*
Spirituality/Prayer	17 (60.71%)	21 (58.33%)	20 (62.50%)	NS
Herbal/Botanical/Supplements	14 (50.00%)	18 (50.00%)	23 (71.88%)	NS
Homeopathy	20 (71.43%)	25 (69.44%)	26 (81.25%)	0.022*

#Chi-square.
*Fisher's Exact Test.
NS, not significant (P > 0.05).

HCP. Various components of the questionnaire had a subset of participants who neglected to answer specific questions. Out of 96 completed surveys, 11 surveys were incomplete (approximately 11.5%). In the SCI group, level of injury (LOI) was from C4 to L1 with a mean time since injury (TSI) of 11.3 (2.5) years. Two individuals in this group did not specify a LOI or TSI.

Current or future use of CAM and likelihood to recommend it

Participants with SCI were more likely than their F&F SCI and HCP to use CAM in the meditation/yoga/relaxation/imagery (P = 0.008), massage (P = 0.012), and osteopathy (P = 0.009) modalities. F&F SCI reported greater exposure to T'ai Chi/Qi Gong (P = 0.033) and therapeutic touch/Reiki (P = 0.009) (Table 3). Participants with SCI were more likely to recommend the use of CAM when compared with the other two groups, particularly in biofeedback (P = 0.039), meditation/yoga/relaxation/imagery (P = 0.0002), massage (P = 0.013), osteopathy (P = 0.006), and spirituality/prayer (P = 0.001). Again, F&F SCI were more likely to recommend the T'Chi/Qi Gong (P = 0.011) and therapeutic touch/Reiki (P = 0.033) modalities (Table 4). For the "would ever use" comparison, participants with SCI, F&F SCI, and HCP all showed greater willingness to try specific CAM modalities: SCI showed a greater willingness to try osteopathy (P = 0.026), F&F SCI would be more likely to use/try hypnosis (P = 0.008), T'ai Chi/Qi Gong (64.29%), traditional oriental medicine (P = 0.029), and Ayurveda (P = 0.040), and

Table 6 Beliefs and opinions regarding CAM.[21]

	Question	Mean response on 7-point Likert scale°			P – value
		SCI[#] (n = 28)	F&F SCI* (n = 36)	HCP[†] (n = 32)	
1	The spiritual beliefs and practices of physicians play no important role in healing.	3.64	3.32	3.58	NS
2	The spiritual beliefs and practices of patients play no important role in healing.	2.39	2.79	2.10	NS
3	It is irresponsible for physicians to recommend acupuncture to patients with conditions like chemotherapy-related nausea and vomiting or headache.	3.85	3.21	3.52	NS
4	Physicians knowledgeable of multiple medical systems and complementary and alternative practices (i.e., Chinese, Ayurvedic, Osteopathic, Homeopathic, etc.), in addition to conventional medicine, generate improved patient satisfaction.	3.93	4.53	4.87	NS
5	Therapeutic touch has been completely discredited as a healing modality.	3.36	3.53	3.84	NS
6	Chiropractic is a valuable method for resolving a wide variety of musculoskeletal problems (beyond back pain).	3.82	4.27	4.19	NS
7	The physician's role is primarily to treat disease, not to address personal change and growth of patients.	3	2.36	2.68	NS
8	Massage therapy often makes patients "feel" better temporarily, but does not lead to objective improvement in long-term outcomes for patients.	4.43	3.94	4.32	NS
9	Physicians should be prepared to answer patient's questions regarding the safety, efficacy, and proper usage of commonly used botanical medicines such as Saw Palmetto, St. John's Wort, Valerian, etc.	5.82	5.75	5.94	NS
10	Counseling on nutrition should be a major role of the physician towards the prevention of chronic disease.	4.61	5.36	6.0	NS
11	Osteopathic manipulative therapy is a valuable method for resolving a wide variety of musculoskeletal problems (beyond back pain).	4.67	4.59	4.75	NS
12	It is ethical for physicians to recommend therapies to patients that involve the use of subtle energy fields in and around the body for medical purposes (i.e. Reiki, Healing touch, Therapeutic touch, etc.)	4.5	4.29	3.94	NS
13	The physical and mental health aremaintained by an underlying energy or vital force.	5.03	4.39	4.0	NS
14	Health and disease are a reflection of balance between positive life-enhancing forces and negative destructive forces.	5.26	4.24	4.0	NS
15	The body is essentially self-healing and the task of a health care provider is to assist in the healing process.	4.64	4.34	4.13	NS
16	A patient's symptoms should be regarded as a manifestation of a general imbalance or dysfunction affecting the whole body.	5.29	4.89	4.97	NS
17	A patient's expectations, health beliefs and values should be integrated into the patient care process.	4.21	4.5	5.28	NS
18	Complementary therapies are a threat to public health.	2.79	3.46	2.66	NS
19	Treatments not tested in a scientifically recognized manner should be discouraged.	3.29	3.5	4.12	NS
20	Effects of complementary therapies are usually the result of a placebo effect.	4.36	3.93	3.56	NS
21	Complementary therapies include ideas and methods from which conventional medicine could benefit.	5.07	4.56	5.28	NS
22	Most complementary therapies stimulate the body's natural therapeutic powers.	2.96	3.33	4.19	NS

°Likert scale 1–7, where 1 is absolutely disagree and 7 is absolutely agree.
[#]Spinal cord injury; *Friends & family of patients with SCI; [†]Healthcare professionals.
NS, not significant (P > 0.05).

HCP would be more likely to use/try Curanderismo (P = 0.014), chiropractic (P = 0.015), therapeutic touch/Reiki (P = 0.023), and homeopathy (P = 0.022) (Table 5).

For the Likert scale component of the questionnaire assessing the participants' beliefs and opinions on CAM, no comparisons between the three groups were significant for any of the twenty-two questions (Table 6).

Discussion

To our knowledge, this is the first study to examine the use of CAM in individuals with SCI compared with non-SCI and to illustrate a dichotomy between these populations. As hypothesized, Patients with SCI and F&F SCI are more likely to have used CAM and to recommend its use when compared to HCP.

Research into treatment of SCI and its secondary complications continues; however, at the present time, there is no one therapy that is known to improve or cure all impairments caused by SCI.[2] In a previous study, the authors directly correlated a lower satisfaction of life in patients with SCI with the number of secondary health complications associated with SCI.[27] Consequently, as indicated by our study, it is not surprising that those

with SCI have more experience with CAM given the numerous health complications patients must manage following the injury. Patients with SCI must find a medical regimen tailored to their individual complications and needs. This regimen may consist of a large variety of therapeutic modalities, including CAM, which are considered unconventional in standard of care practice.

Our finding that participants with SCI and F&F SCI have more experience with CAM and are also more likely to recommend CAM to others relative to HCP, is in agreement with a study by Pannek *et al.*[6] This study showed a positive correlation between the use of CAM and satisfaction in the SCI population, as well as a greater likelihood of patients with SCI to recommend CAM to others when they were satisfied with their own CAM experience. Thus, SCI participants in our study may be more likely to recommend CAM because of higher level of satisfaction with the alternative form of healthcare. It should be taken into consideration that T'ai Chi/Qi Gong is a modality that may not be adaptive to a portion of our participants with SCI, and could account for the reason that a higher proportion of F&F SCI reported use of the modality. The greater use of CAM and willingness to recommend CAM in the SCI and F&F SCI groups compared to the HCP group may potentially be explained by the extensive training HCP receive in conventional medicine. This training understandably results in greater knowledge of conventional medicine, such that they are more likely to prescribe or recommend conventional treatments to patients. Research has shown that physicians feel they do not have enough familiarity and knowledge of CAM and that further education is necessary for integration of CAM into their practices.[28,29] Increasing such knowledge may result in greater usage of alternative treatment plans to supplement conventional medicine and improve outcomes for secondary complications associated with SCI.

When asked if they would ever use or try CAM, the results were more diverse with each group showing more willingness to potentially use certain modalities. This finding is not surprising as the question of whether or not a participant would ever use CAM is theoretical. Additionally, when asked about their beliefs and opinions regarding CAM, the SCI, F&F SCI, and HCP groups alike, all agreed that CAM was not a threat to public health and that conventional medicine could benefit from the integration of CAM ideas and methods. They also agreed that healthcare providers who had knowledge of CAM in addition to conventional medicine would increase patient satisfaction. The fact that participants agree on these fundamental positive beliefs and opinions regarding CAM, serves as an explanation for their agreement on willingness to ever use CAM. Our results support multiple other studies that have illustrated healthcare provider interest in CAM, as well as the necessity for providers to become educated about alternative medicine.[28–31] Increasing education and awareness regarding CAM practices may result in a greater number of healthcare professionals and laypersons recommending and inquiring about its use.

In the present study, the rates of reported CAM usage widely ranged based on the modality (Table 3). The wide range of reported CAM use in the present study is in alignment with others that have analyzed the use of CAM in the general population.[3,32] Frass *et al.*[3] conducted a meta-analysis of 16 papers studying CAM in the general population, and found that the prevalence reported among the individual studies ranged from 5% to 74.8%. The individual studies included in their meta-analysis varied in the assessed CAM modalities, the countries where the assessments occurred, and the timeframe in which the studies were conducted, and ultimately may have contributed to the observed range.[3] Moreover, Peltzer and Pengpid[33] studied the prevalence of CAM in 32 countries, citing an overall prevalence of 26.4%, ranging from under 10% to over 50% depending on the country sampled, while Pannek *et al.*[6] surveyed participants with SCI at a rehabilitation center in Switzerland, and reported CAM use at a rate of 73.8%. Furthermore, the National Institutes of Health[32] reports CAM usage at 38% across the general adult population, while our study is evaluating individuals with a cord injury, and individuals who are a part of their care or personal lives. Collectively, these studies, as well as our own, illustrate the heterogeneity that various sample populations can display, based off of participant demographics, geographic location, and the specific CAM modalities surveyed.

This study is not without limitations. First, the number of individuals in each of the groups was relatively small and could have resulted in a type-two error. Moreover, there were some participants who incompletely filled out their surveys which could have influenced our results. Nonetheless, we still had significance. Second, survey questions could have been misinterpreted or interpreted differently among participants, but because both surveys are validated and reliable, the chance of this limitation was reduced.[21,22] Along similar lines, only four of the fourteen modalities were defined in the survey and provided for participants (Table 2). This leaves the definition and interpretation of the other modalities up to the discretion of

participants, and could lead to erroneous responses on the survey. For example, 100% of participants reported having ever used Curanderismo. This can be explained by the definition (Table 2) that was provided to participants, which describes Curanderismo as inclusive of prayer, herbal medicine, healing rituals, spiritualism, massage, and psychic healing. The definition of this CAM modality is likely familiar to most people due to the many components comprising its definition. Third, voluntary participation may have created a sampling bias as those willing to participate may have been more inclined to complete the survey due to greater interest in CAM. Similarly, because so many of our health care providers from our academic rehabilitation center indicated usage of CAM, a sampling bias could have been created. Fourth, our data was dependent on subjective self-reporting by the participants versus objective findings. Lastly, the higher reported rates of CAM usage in the current study could have led to potential for bias.

Conclusion

According to our study, a dichotomy exists in the SCI and F&F SCI populations compared with the HCP population when it comes to the use of CAM. Patients with SCI and their F&F SCI, have more experience with CAM when compared with healthcare professionals. This difference in experience is important to acknowledge as it relates with the likelihood to recommend CAM use. This suggests that if healthcare professionals had more training, and therefore experience with CAM, they may be more willing to recommend it to their patients. This is of particular value in the SCI population where alternative medicine may be a helpful adjunct to conventional medicine in the management of secondary complications of injury.

Disclaimer statements

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ORCID

Gary J. Farkas http://orcid.org/0000-0002-5482-6049

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